

Severe local storms.

(The table herewith contains such data as have been received concerning severe local storms that occurred during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.)

Place.	Date.	Time.	Width of path.	Loss of life.	Value of property destroyed.	Character of storm.	Remarks.	Authority.
Seattle and western Washington.	13		Yards.	11		Landslides and rain.	No property damage reported.	Washington Herald (Washington, D. C.).
Pittsburgh, Pa.	17					Wind and rain.	Much damage caused to wires, plate glass, etc. Traffic and electric light and power operations interfered with.	Official, United States Weather Bureau.
Greenwood, S. C., and vicinity.	17	p. m.				Wind.	One person injured and some buildings and trees damaged.	Greenville News (Greenville, S. C.).
Milwaukee, Wis., and vicinity.	17					Wind and snow.	Lake traffic delayed and telephone service interfered with. Several accidents reported.	Journal (Milwaukee, Wis.).
Alpena, Mich.	17-18					Ice.	All overhead wire systems impaired, forest trees bent to ground. Ice covering on ground so great and continued so long that small game and birds were deprived of food.	Official, United States Weather Bureau.
New York (central and western sections, especially Buffalo).	17-18			2	\$1,500,000	Wind.	Severe damage to shipping. Dwellings on lake front, docks and piers destroyed. Boats stranded, telephone and telegraph lines impaired, electric light and car service badly crippled. Houses and barns unroofed. Numerous persons injured.	New York Herald (New York, N. Y.).
Wellsboro, Pa.	18	a. m.				do.	General damage done.	Wellsboro, Pa.
New York City, N. Y. (The Bronx).	18					do.	Severe general damage.	New York Tribune (New York, N. Y.).
Sunbury, Pa. (Northumberland and adjoining counties).	18					do.	Heavy damage to lines of communication; roofs and trees suffered.	Herald (New York, N. Y.).
Linden, N. J.	18				30,000	do.	Two houses damaged; sheds and garages destroyed; 3 persons injured.	The World (New York, N. Y.).
Lone Pine, La.	19			1		do.	School house and 3 dwellings destroyed, other buildings damaged; several injured.	Post (Chicago, Ill.).
Illinois (central portion).	22-23				150,000	Ice.	Much damage to overhead electrical systems.	Official, United States Weather Bureau.
Tennessee (near Phelan, Tipton County).	23				20,000	Tornado.	Considerable property damaged; 2 injured.	Do.
Arkansas (near Clarkedale).	23	p. m.	166	6	150,000	do.	Number of buildings wrecked, gin, warehouses, residences, etc.; 15 persons seriously injured.	Do.
Northeastern Louisiana (Union and Morehouse Parishes).	24	12:30 a. m.	200	2	60,000	do.	Nearly all buildings in Spencer destroyed, 20 box cars demolished, timber damaged; many persons injured.	Do.
California (central and southern portion).	18-27			4	2,500,000	Wind and rain.	Property damaged, communication disrupted, bridges washed away, vessels blown from moorings, considerable havoc caused along coast.	Post (Washington, D. C.).
Helena, Mont., and vicinity.	30	a. m.				Wind.	Minor damage.	Record-Herald (Helena, Mont.).
Butte, Mont.	30	1:30 a. m.				do.	General damage done.	Do.
Milwaukee, Wis.	30-31					do.	Caused considerable damage and seriously interfered with lake shipping.	Official, United States Weather Bureau.

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STORMS AND WEATHER WARNINGS.

WASHINGTON FORECAST DISTRICT.

Storm warnings.—A disturbance of marked intensity was central over eastern Iowa at 8 p. m. of the 1st, moving rapidly northeastward, and northwest storm warnings were ordered displayed at 10 p. m. on Lakes Superior and Michigan and southwest warnings on Lakes Huron, Erie, and Ontario. The next morning warnings were displayed on the Atlantic coast from Jacksonville, Fla., to Eastport, Me. These warnings were well verified on the Great Lakes and at a number of coast stations.

The next storm warnings were issued for the Atlantic coast from Cape Hatteras to Boston, Mass., at 1:30 p. m. of the 4th, when a disturbance was central over North Carolina and increasing rapidly in intensity.

On the evening of the 9th southwest storm warnings were displayed on Lakes Erie and Ontario in connection with a disturbance that was moving rapidly eastward over the northern Lake region.

At 8 a. m. of the 17th a disturbance of considerable intensity was central over southern Lake Michigan, moving east-northeastward, with a strong area of high pressure to the eastward. Southwest storm warnings were displayed at 11 a. m. on the Atlantic coast from Cape Hatteras to Eastport, Me., and on the east Gulf coast from Bay St. Louis, Miss., to Cedar Keys, Fla. Advisory warnings were also sent to open ports on Lake Michigan and forecasts of gales were included in the forecasts for States bordering on the Great Lakes. All warnings were fully verified. This storm increased greatly in intensity

as it advanced over the Lake region and it was attended by strong gales, the wind velocity at Buffalo, N. Y., reaching 96 miles an hour from the southwest, equaling the highest ever before recorded (Dec. 23, 1920), and continuing extremely high for a much longer period than ever before. During the three hours from 9 a. m. to noon of the 18th, 268 miles were recorded, or an average velocity of 89.3 miles per hour, and from 5 a. m. to 5 p. m., 907 miles, or an average of 75.6 miles per hour. Property damage in Buffalo and vicinity due to this storm is estimated at from \$1,000,000 to \$1,500,000. Of the 62 vessels loaded with grain which were anchored beneath the break wall 27 were torn from their moorings and swept on to the beach and it is probable that a greater number of vessels would have been torn loose and damaged had it not been for the timely warnings disseminated from the Buffalo Office of the Weather Bureau. The Buffalo Commercial of December 19 says in an editorial:

It is unlikely that there has been in years a storm of such sustained fury. That there was no greater damage to shipping is due, of course, to the fact that there was ample warning given by the Weather Bureau.

A disturbance that developed over the Lake region on the 20th moved rapidly eastward to the lower St. Lawrence Valley with a marked increase in intensity, and it was followed during the 21st by a decided increase in pressure and gales along the Middle Atlantic and North Atlantic coasts, for which warnings were issued on the morning of the 21st. Another storm of somewhat similar character was central over the lower St. Lawrence Valley on the morning of the 29th and northwest storm warnings were ordered for the Atlantic coast from Cape Hatteras

to Eastport, Me. A maximum wind velocity of 64 miles an hour was registered at New York, N. Y., and 56 miles at Block Island, R. I., Atlantic City, N. J., and Cape Henry, Va.

Another severe storm moved eastward over the Lake region during the 31st attended by gales throughout the Lake region and along portions of the Middle Atlantic and North Atlantic coasts. The highest velocity reported was 80 miles an hour from the southwest at Buffalo, N. Y. Ample warnings were issued in connection with this storm.

Cold-wave warnings.—No cold-wave warnings were issued or required, except for very limited areas, until the 21st, when a disturbance of considerable intensity over the North Atlantic States and the lower St. Lawrence Valley was followed by a decided increase in pressure and a marked fall in temperature over Ontario and the Lake region and cold-wave warnings were ordered for New England, New York, Pennsylvania, New Jersey, Delaware, Maryland, and the District of Columbia. These warnings were fully verified.

During the 23d–24th a disturbance moved rapidly eastward over the Lake region and the Northeastern States and it was followed by rapidly rising pressure and much colder weather, and cold-wave warnings were ordered for the Lake region, the Ohio Valley, Tennessee, the East Gulf States, northern New England, and northern and central New York. These warnings were only partially verified.

During the last two days of the month there was marked activity in the movement of areas of low and of high pressure accompanied by marked fluctuations in temperature over northern sections east of the Rocky Mountains. Cold-wave warnings were ordered for New England, New York, New Jersey, eastern Pennsylvania, and northern Michigan on the evening of the 28th and the morning of the 29th, and for northern Vermont and extreme northern New York on the evening of the 31st.

Frost warnings.—Frost warnings were issued on the following dates for portions of the South Atlantic and East Gulf States: 4th, 5th, 6th, 9th, 10th, 17th, 18th, 25th, 26th, and 31st. However, no frost warnings were issued for southern Florida during the month.—*C. L. Mitchell.*

CHICAGO FORECAST DISTRICT.

With the exception of advices issued to the stock interests in Nebraska and Wyoming on the morning of December 2, no special warnings were ordered from the Chicago Forecast District until the middle of the month. Following the storm which necessitated the issuance of stock warnings on the above date, the weather throughout the district until the 15th was dominated by an area of high pressure which persisted over the Plateau region, thus causing generally fair weather with temperature considerably above normal.

By the 15th, however, a depression had formed over the middle Rockies with much colder weather and high pressure to the north and northwest. On the 15th and 17th, cold-wave warnings were issued for portions of the northern Rocky Mountain region.

However, the first severe cold of the present season, accompanied by an area of strong high pressure, did not appear in the Northwest until the morning of the 18th and during the period from the 18th to 20th, spread slowly eastward and southward over the district, warnings being issued in advance in connection with its movement. Advices to stock interests in the northern Rocky Mountain

region and the Plains States were issued on the 18th and 19th.

On the morning of the 22d another HIGH appeared in the Canadian Northwest and during the 23d and 24th moved eastward and southward, warnings during this period being issued only for the eastern portion of the district. On the 23d, stock advices were issued for Nebraska, Kansas, and southern Wyoming.

On the 28th cold-wave warnings were issued for eastern North Dakota and northern Minnesota, following the movement of a disturbance of moderate intensity across the northern Lake region.—*E. H. Haines.*

NEW ORLEANS FORECAST DISTRICT.

On December 1, southeast storm warnings were displayed from Port Arthur to Velasco, Tex., and small-craft warnings from Velasco to Brownsville, because of squally conditions in a trough of low pressure which extended from the upper Mississippi Valley to Texas. Another depression was centered over the Texas Panhandle on the p. m. map of the 2d and southeast storm warnings were ordered on the east coast of Texas. A large high-pressure area was moving down over Texas on the p. m. of the 3d, and northwest storm warnings were ordered for the Texas coast, Port Arthur to Velasco. These warnings were verified.

On the morning of the 8th, northwest storm warnings were displayed from Port Arthur to Velasco and small-craft warnings on the remainder of the Texas coast because of an area of high pressure advancing southeastward in the rear of a disturbance over Louisiana. Fresh winds prevailed during the day.

Small-craft warnings were displayed on the Louisiana and Texas coasts at 8:20 a. m. (Central Time), on the 17th, for strong northwest winds diminishing at night. The wind was already strong at the time the warning was issued and diminished during the afternoon.

Small-craft warnings were displayed on the Texas coast on the 23d, and northwest storm warnings were issued for the east coast of Texas at night on the 23d. The next morning the storm warning was extended over the remainder of the Texas coast and small-craft warnings were displayed on the Louisiana coast. Winds occurred as forecast.

Small-craft warnings were displayed on the Texas coast on the 31st and were justified.

Advices were issued on the 8th, 17th, and 25th, to interests represented in Tampico, Mexico, for strong northerly winds to moderate gales, and on the 25th for Progreso, Mexico.

Cold-wave warnings were issued at 8:40 p. m. of the 2d, for northwestern Arkansas, Oklahoma, and northern Texas, and were repeated next morning except for the northern portion of west Texas. The warning was fully verified in Oklahoma and at Abilene, Tex., and a decided fall in temperature occurred in the remainder of the territory warned.

Cold-wave warnings issued at 8:40 a. m. of the 16th, for Oklahoma and northwestern Texas, and on the 17th for Port Arthur, Tex., were justified.

Cold-wave warnings issued 8:45 p. m. on the 18th, for Oklahoma, were repeated and extended on the 19th to northwestern Arkansas and the northwest portion of east Texas, were repeated again at 8 p. m.; and on the 20th they were repeated, 9 a. m., and extended over Arkansas and the northern portion of east Texas; a coal wave occurred in Oklahoma, and much colder prevailed in other portions of the district covered by warnings.